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INFORMATION CIRCULAR NO. 7

INTERIM REPORT

ON

SURFACE WATER RESOURCES AND QUALITY OF WATERS IN LEE COUNTY, FLORIDA

BY

WILLIAM E. KENNER and EUGENE BROWN

PREPARED BY U.S. GEOLOGICAL SURVEY
IN COOPERATION WITH THE FLORIDA GEOLOGICAL SURVEY
AND THE CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT

Tallahassee, Florida
1956

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PART I

SURFACE WATER RESOURCES OF LEE COUNTY, FLORIDA

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U. S. Geological Survey

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PREFACE

This report was prepared in the Surface Water Branch of the U. S. Geological Survey under the direct supervision of A. O. Patterson, District Engineer. Its preparation was made possible by the cooperation of the Central and Southern Florida Flood Control District, W. Turner Wallis, Secretary.

Most of the basic water-resources data in this report have been collected by the U.S. Geological Survey in cooperation with the Corps of Engineers, the City of Fort Myers, the Florida Geological Survey, and the Florida Division of Water Survey and Research. Some data were furnished by the Corps of Engineers.

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By
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INTRODUCTION

The purpose of this report is to provide such information on the surface-water resources of the county as may be useful in planning for their more intensive use. This report is not intended to provide final answers to all questions concerning the occurrence of surface water in the county, because of the paucity of information on the various streams in the area. However, as an initial step it should prove valuable in the formulation of plans for the future.

To the author's knowledge, no similar report has been published, although much of the basic data used in this one have been released in publications of the U. S. Geological Survey and the U. S. Weather Bureau.

This report is intended to give the best answers - that are presently available - to the following questions:

1. Where within Lee County are surface supplies of water located?

2. What are the variations in this supply?

3. What can be done to provide better answers to questions 1 and 2 than are available at the present time?

DESCRIPTION OF AREA

Lee County is on the west coast of peninsular Florida opposite the southern edge of Lake Okeechobee (see Fig. 1). It has a land area of 786 square miles, 35 percent of which is in farms. Tourist trade, agriculture, and commercial fishing are the main sources of income. Fort Myers, on the Caloosahatchee River and 13 miles from the Gulf of Mexico, is the principal city and the county seat. Its 1950 population was 13,195. Total population of the county was 23,404. The growth in population of Fort Myers since 1890 is shown in Figure 2.

CLIMATE

The average temperature at Fort Myers is 73.4 degrees. January is usually the coolest month, with an average of 63.8 degrees, and August the warmest with an average of 81.5 degrees. Frost rarely occurs here. The average yearly rainfall is 52.39 inches. Figure 3 shows the variations in temperature and rainfall. The subtropical climate of the area makes possible the growing of citrus fruits, tropical fruits, such as mangoes, papayas, and others, as well as truck and staple crops.

OCCURRENCE OF SURFACE WATER

The surface-water supplies in Lee County obtain from water falling as rain on its land surface and flowing into the lakes and streams; from surface streams bringing water into the county; and from water entering the county through underground formations and making its way to the surface. Of course, not all of the water entering the county is available for use since evaporation, transpiration, and seepage into the ground take a heavy toll.

There are two essential factors to be considered in a study of the surface water of an area. One is the areal distribution. In other words, at what geographic locations within the area are the supplies located? The second is the time distribution of the supplies, or, what is the day by day, month by month, or year by year variation in the amount of water occurring at the various locations?

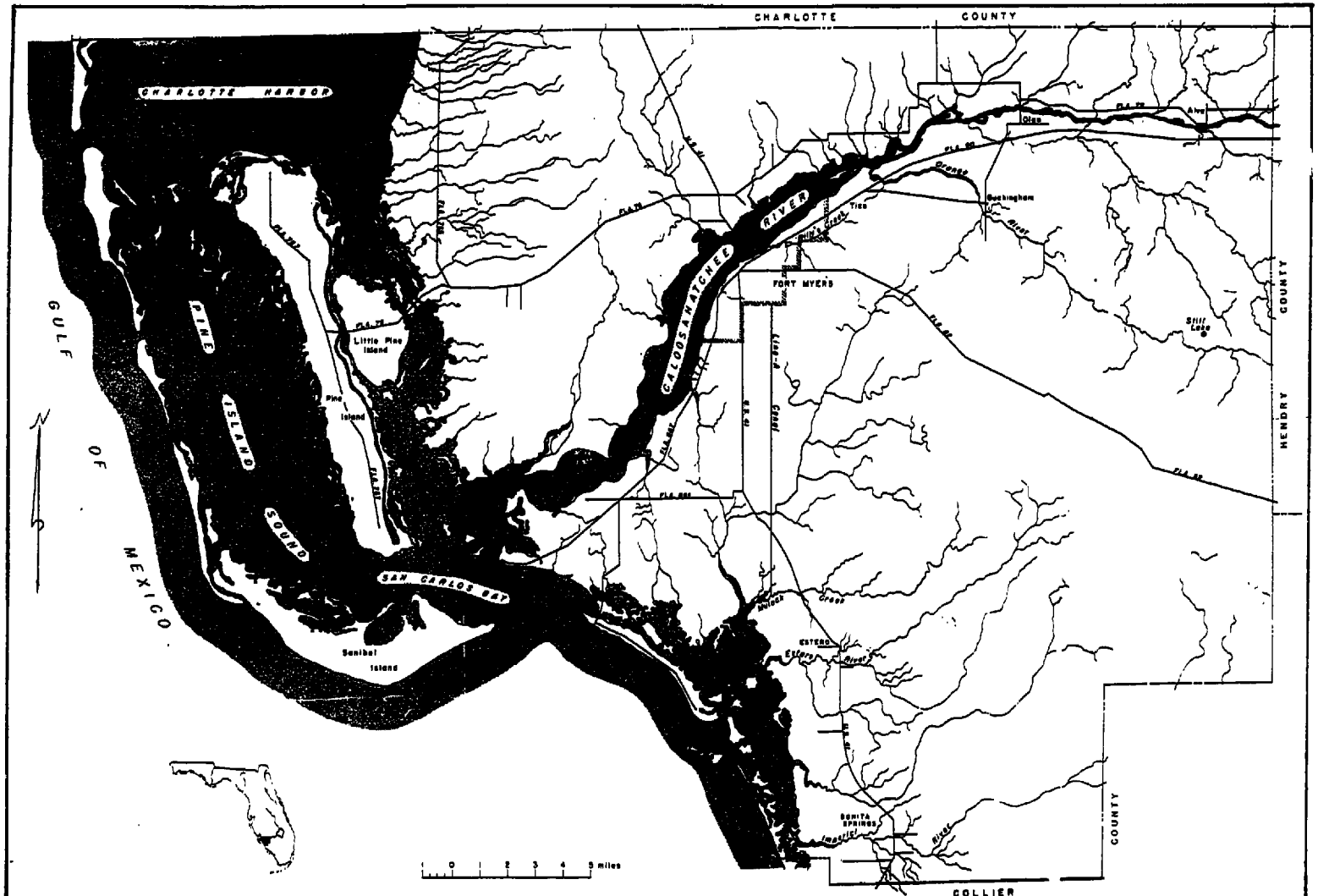

Figure 1. Map of Lee County, Florida, showing surface water features.

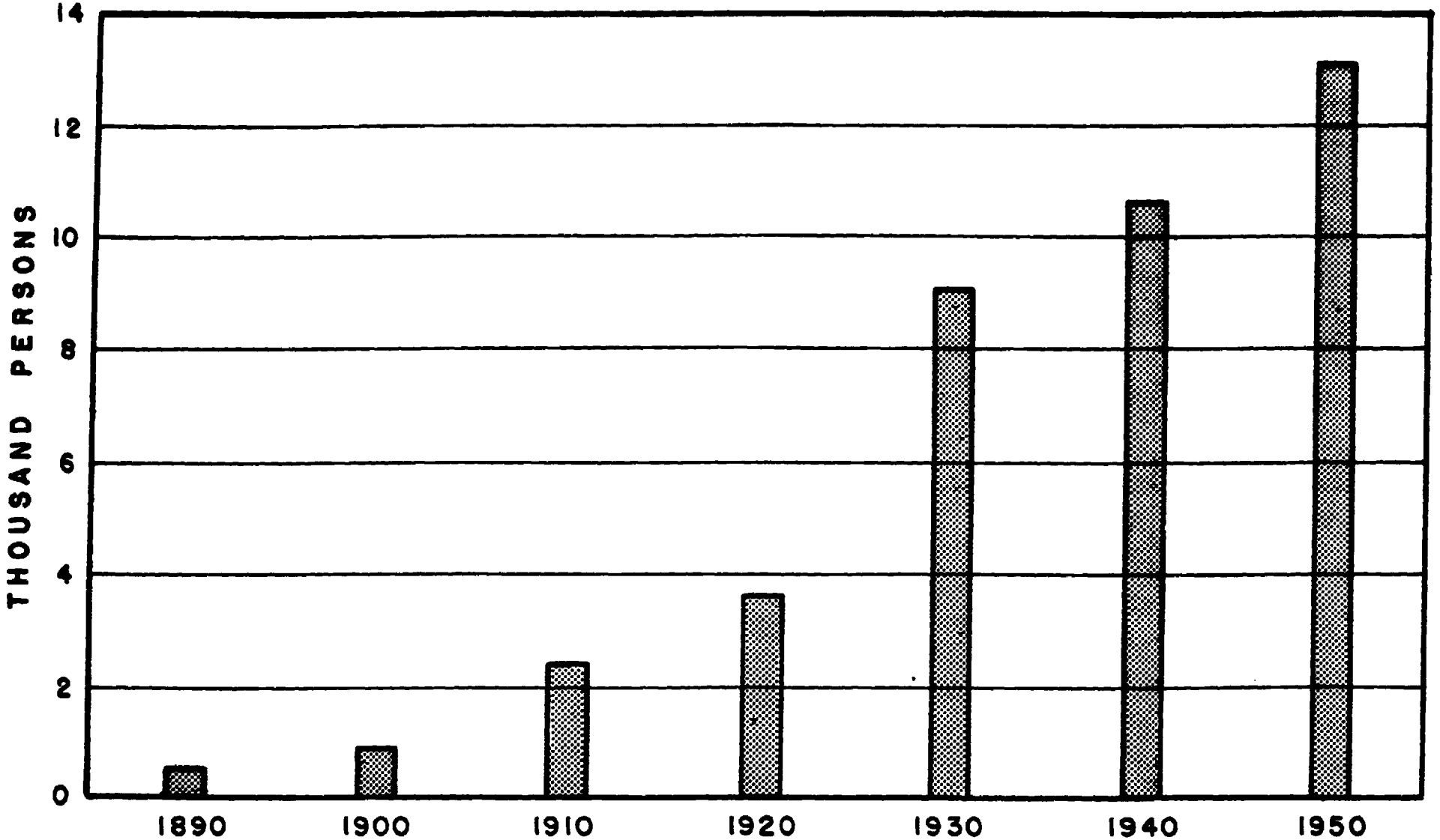

Figure 2. Growth and population of Fort Myers.

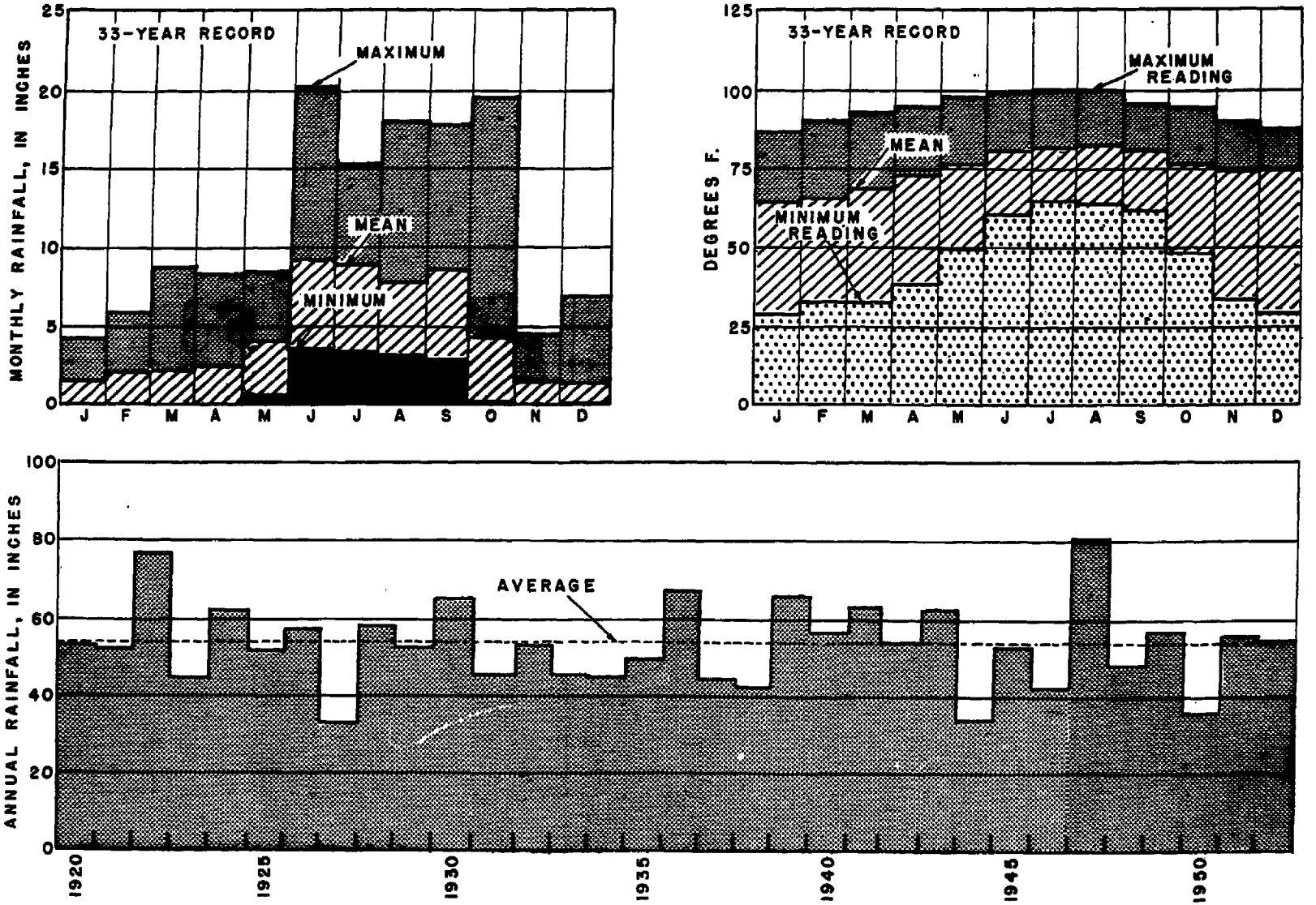

Figure 3. Climatological data for Fort Myers.

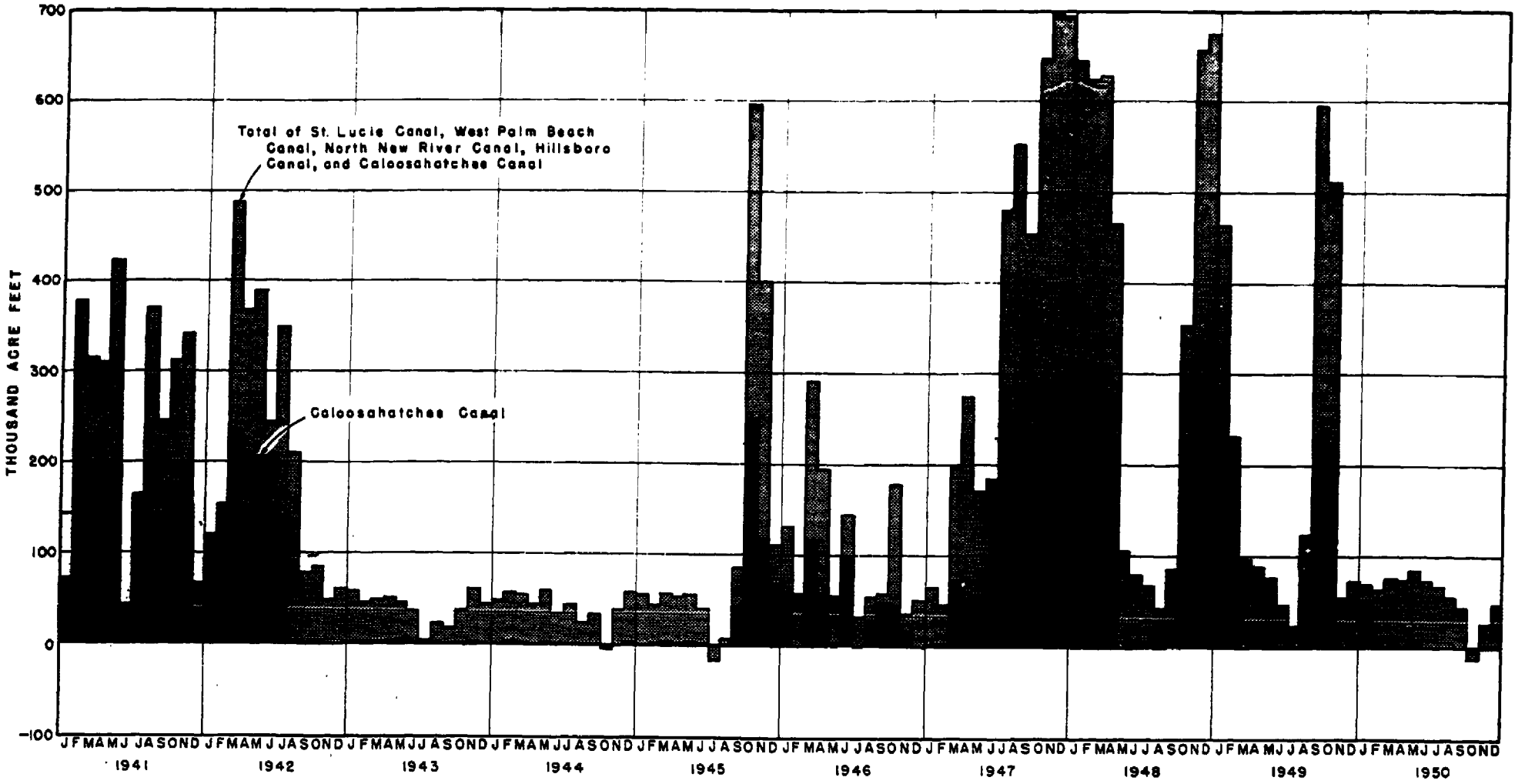

Figure 4. Outflow from Lake Okeechobee.

AREAL DISTRIBUTION

The largest single source of surface water in Lee County is the Caloosahatchee River. It carries the water discharged into it from Lake Okeechobee through the locks at Moore Haven as well as the runoff from some 1500 square miles of land area between the Lake and the Gulf. The runoff from about 35 percent of the land area of Lee County moves to the Gulf via this stream. The principal tributaries to the Caloosahatchee River, as well as other streams in the county, and a general picture of the drainage pattern are shown on Figure 1.

CALOOSAHATCHEE RIVER

For many years the Caloosahatchee River has been canalized at its upstream end and connected with Lake Okeechobee, and has served as one of two principal outlets from the Lake. The 15-mile portion of this stream between Lake Okeechobee and Ortona Lock is called Caloosahatchee Canal and the portion from Ortona Lock to the Gulf is called Caloosahatchee River.

In October 1948, gages were installed on the Caloosahatchee River at Alva and Olga and daily stage records were obtained until their discontinuance in December 1950. The datum of each of these gages was at mean sea level, datum of 1929. The flow was measured at Alva on October 1, 1948, and was 12,600 cubic feet per second. This extremely high flow came as a result of heavy rains accompanying a hurricane. Information from local residents indicates that the highest stages known occurred in 1924, reaching 13.3 feet at Alva and 8.2 feet at Olga. Records of the Corps of Engineers show the minimum stages known to have been 1.88 feet below sea level at Alva and 2.68 feet below sea level at Olga. These occurred on October 18, 1944. Because in some years considerable water is released from Lake Okeechobee to flow down the Caloosahatchee Canal, a hydrograph showing the flow through the locks at Moore Haven for the years 1941 to 1950 has been included (Fig. 4). Not included in the values shown is the leakage and lockage, which amounts to about 10 cubic feet per second. To indicate the total amount of water that may be available at Moore Haven, a hydrograph of the total flow out of Lake Okeechobee through all its outlets during the years 1941 to 1950 is also shown in Figure 4.

ORANGE RIVER (TWELVEMILE CREEK)

Orange River is one of the larger tributaries to the Caloosahatchee River. It flows into the Caloosahatchee River from the south about 8 miles upstream from Fort Myers. Its drainage area is 83.4 square miles. From November 1935 to October 1946, records of its stage and discharge were obtained by the U. S. Geological Survey. The datum of the gage was 1.71 feet above mean sea level, datum of 1929. During this period the maximum discharge was 5,300 cubic feet per second, with a corresponding gage height of 13.40 feet, on June 15, 1936. At times flow in this stream ceases. In April 1939 the stage fell below 0.02 foot. As an example of the distribution of flow throughout the year, Figure 5 shows a hydrograph for 1937, a year during which the mean runoff equaled the average for the 10-year period. The monthly and annual runoff for Orange River is listed in Table 1. It is of note that the average yearly runoff for this basin is 7.83 inches per year, or slightly less than 15 percent of the rain that falls. A flow duration curve is shown on Figure 6. This curve shows how much of the time during the period of record (1935-46) various flows were equaled or exceeded. For example, the flow was at or higher than the rate of 9 cubic feet per second for 40 percent of the time. This curve represents the behavior of this stream in the past and, barring significant changes in the drainage basin or climatic pattern, can reasonably be expected to represent the future behavior.

The curve shown on Figure 7 is a very useful tool in the analysis of stream flow and shows the maximum period of deficient discharge of Orange River for the period of record, 1935-46. It shows that the flow of Orange River at the gaging site near Fort Myers was less than 3 cubic feet per second (1 cfs = 0.646 mgd) for as long as $6\frac{1}{2}$ consecutive months.

IMPERIAL RIVER

The Imperial River flows westward near the south boundary of the county to empty into the south end of Estero Bay and thence into the Gulf near the town of Bonita Springs. Since May 1940 the Geological Survey has operated a gaging station on the Imperial River about $1\frac{1}{2}$ miles east of Bonita Springs. The datum of this gage is at mean sea level, datum of 1929.

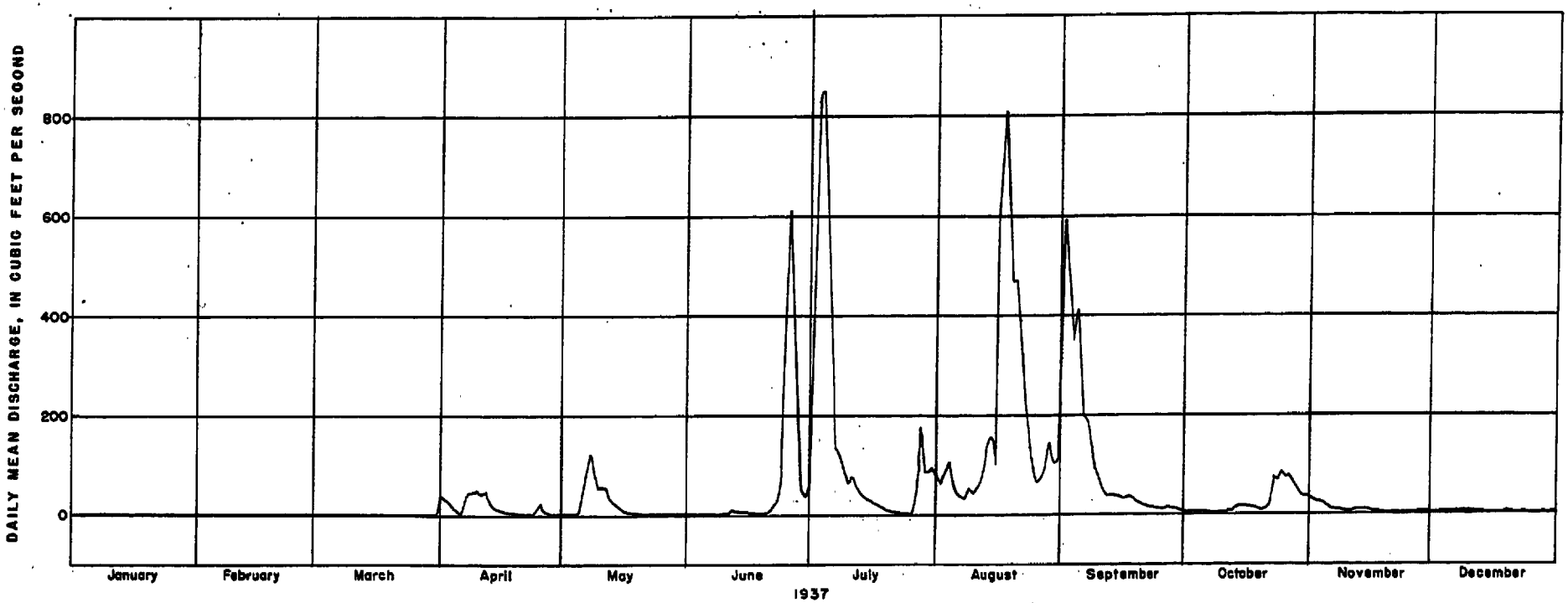

Figure 5. Hydrograph of Orange River.

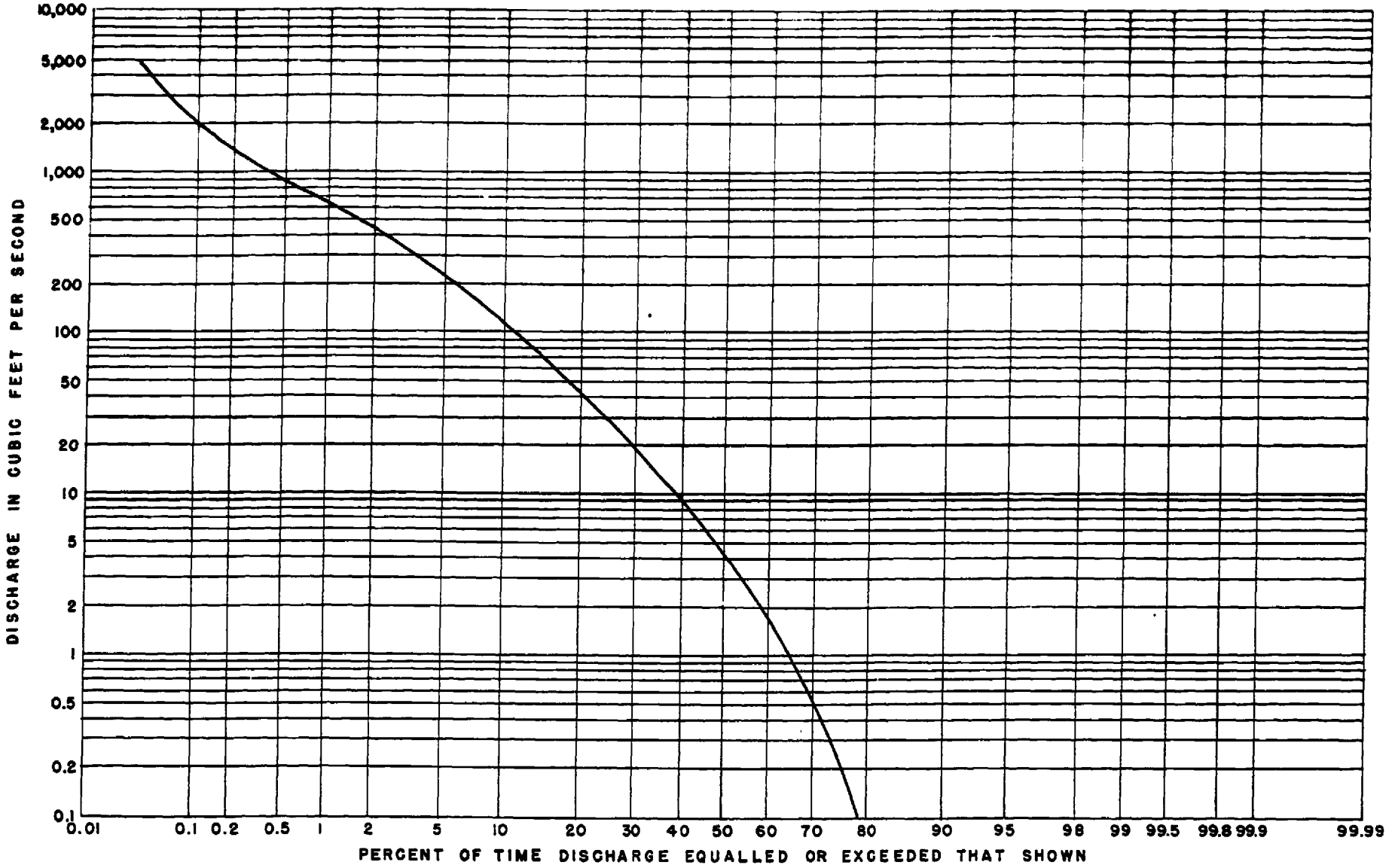

Figure 6. Flow-duration curve for Orange River near Fort Myers, 1935-46.

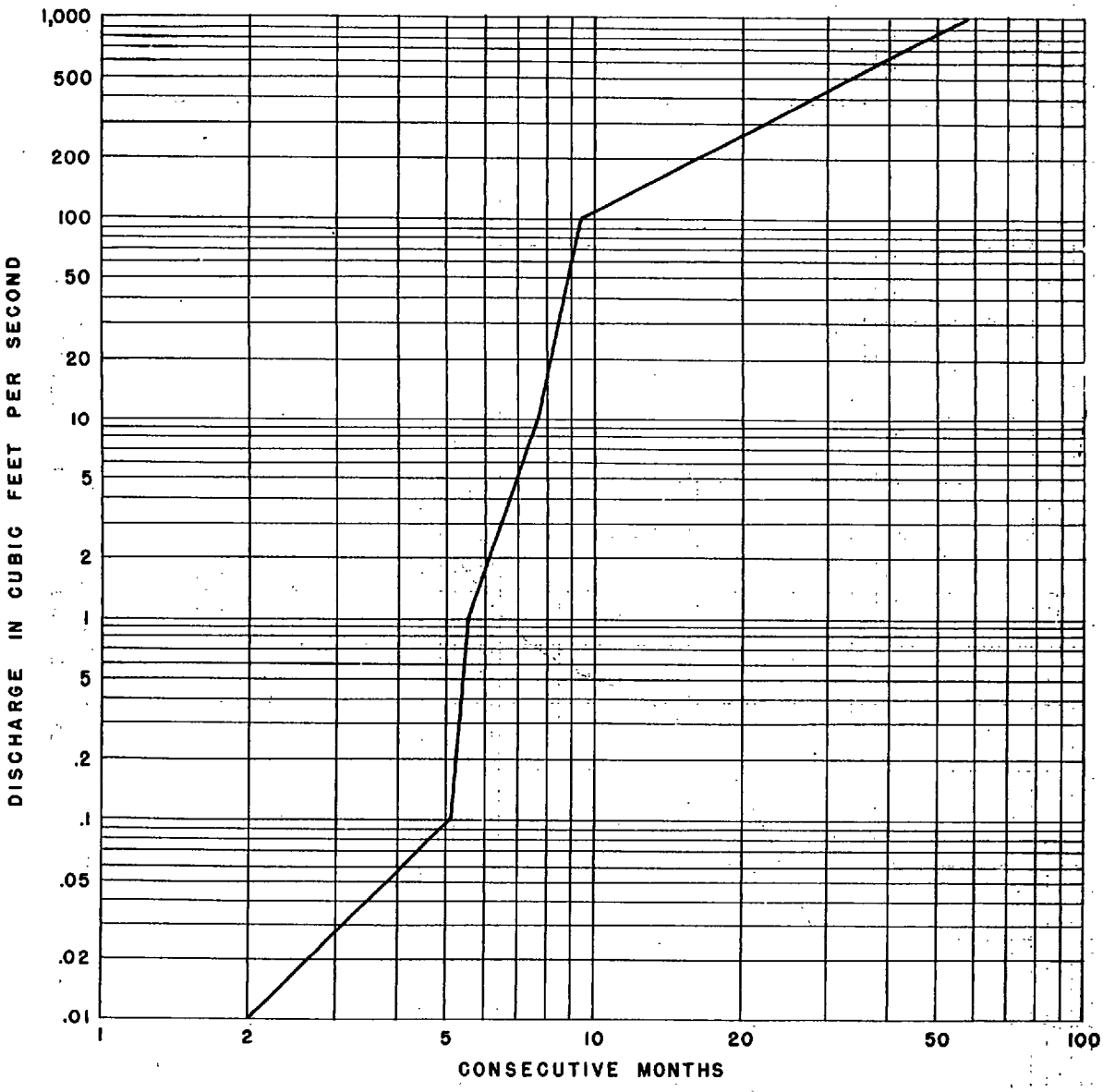

Figure 7. Maximum period of deficient discharge for Orange River near Fort Myers, 1935-46.

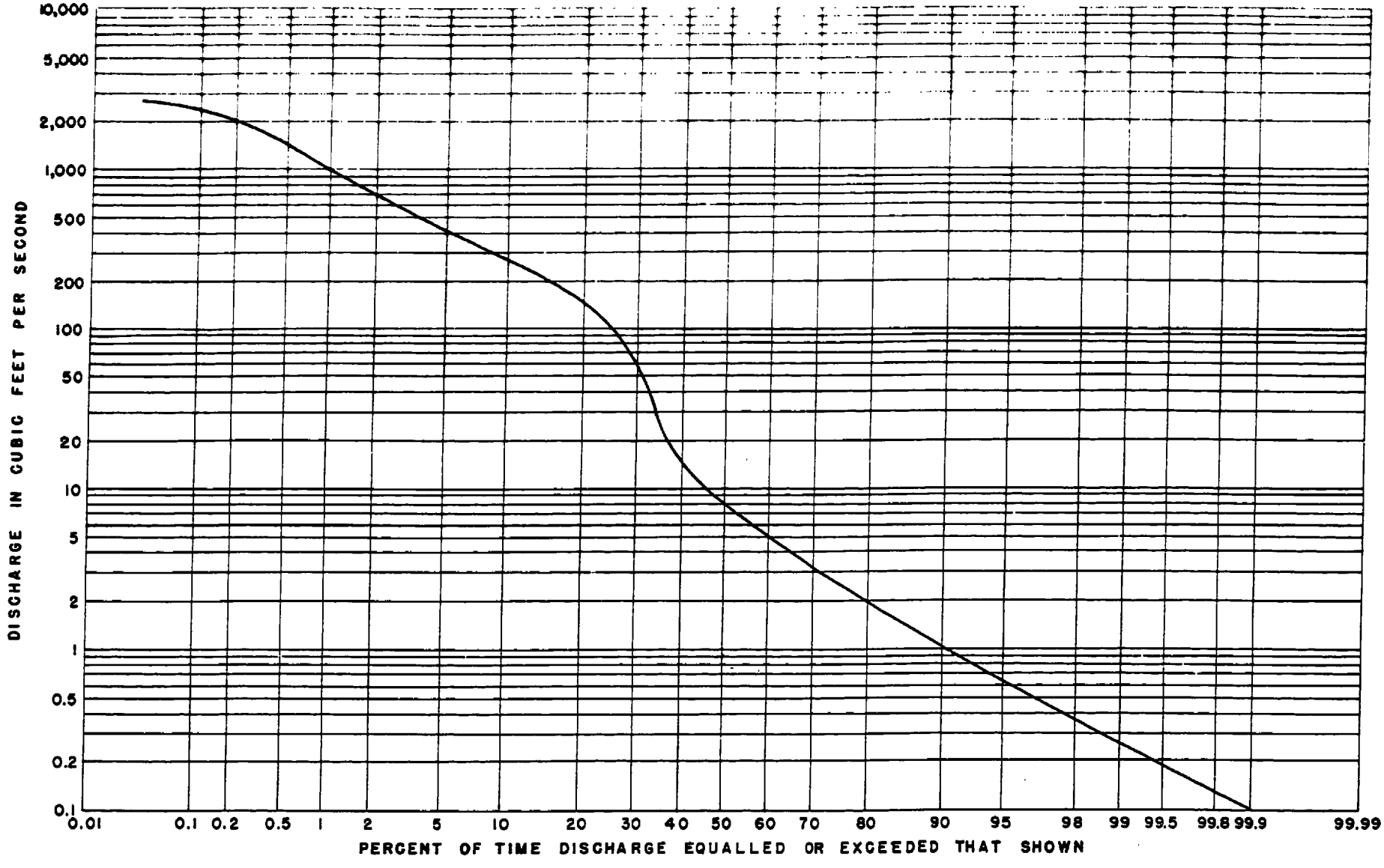

Figure 8. Flow-duration curve for Imperial River near Bonita Springs, 1940-52.

TABLE 1

RUNOFF OF ORANGE RIVER NEAR FORT MYERS

Monthly and annual runoff, in inches

Year	Jan	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1935												0.0007	
1936	0.05	0.59	0.08	0.0005	0.0003	10.26	2.50	0.54	0.40	0.69	0.03	0.0006	15.14
1937	.0003	.0004	.02	.18	.26	.85	2.01	2.73	1.35	.33	.08	.01	7.82
1938	0.006	.0003	.0001	.00001	0	.49	2.24	.82	.25	.35	.02	.0003	4.18
1939	.0003	.0002	.0001	.24	.08	3.24	2.40	3.85	2.30	.25	.05	.01	12.42
1940	.15	.40	.16	.13	.00007	.04	.52	1.68	4.27	.11	.0007	.002	7.46
1941	.12	.59	.35	1.29	.06	.46	3.21	.65	2.12	.20	.04	.005	9.09
1942	.13	.03	.08	.40	.03	.42	.33	.22	1.26	.07	.008	.006	2.98
1943	.005	.002	.008	.01	.08	1.59	3.46	.69	.98	.95	.11	.05	7.93
1944	.06	.04	.04	.05	.09	.13	.54	1.47	.19	.27	.04	.04	2.96
1945	.04	.02	.008	.002	.009	.85	4.13	1.20	.99	.84	.16	.03	8.28
1946	.02	.01	.02	.01	.03	.10	.38	1.86	.81				
Mean	.05	.15	.07	.21	.06	1.68	1.97	1.43	1.36	.41	.05	.01	7.83
Max.	.15	.59	.35	1.29	.26	10.26	4.13	3.85	4.27	.95	.16	.05	15.14
Min.	.0003	.0002	.0001	.00001	.00007	.04	.33	.22	.19	.07	.0007	.0003	2.96

TABLE 2

RUNOFF OF IMPERIAL RIVER NEAR BONITA SPRINGS

Monthly and annual runoff, in thousands of acre-feet

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1940						0.39	2.64	6.36	55.23	6.59	0.68	0.21	
1941	5.31	7.81	3.08	12.29	3.40	3.54	21.05	14.64	12.06	6.61	1.86	.48	92.13
1942	4.43	.48	1.54	.21	.11	7.63	10.09	1.28	10.66	1.00	.10	.09	37.62
1943	.09	.07	.07	.07	.07	5.57	19.39	14.81	9.10	4.43	.20	.12	53.99
1944	.09	.08	.07	.07	.07	.13	.11	7.22	6.37	5.79	.90	.13	21.03
1945	.11	.06	.06	.05	.05	.10	17.63	24.82	19.80	7.66	1.19	.14	71.68
1946	.11	.07	.07	.05	.06	.47	5.56	12.09	12.29	7.95	10.49	1.37	50.58
1947	.17	.10	2.82	.66	.15	19.71	16.83	24.73	60.75	24.97	6.73	4.55	162.2
1948	2.36	1.36	.13	.09	.07	.08	6.00	7.67	21.79	23.03	1.26	.15	63.99
1949	.10	.04	.05	.04	.08	7.87	10.51	15.08	12.91	24.13	3.77	.25	74.84
1950	.10	.07	.86	.07	.04	.05	7.76	2.34	11.37	.43	.13	.11	22.53
1951	.08	.06	.06	.05	.05	.04	7.82	14.50	6.93	49.72	2.62	.19	82.12
1952	.08	.09	.10	.06	.06	.14	6.41	7.26	10.33				
Mean	1.09	.86	.68	1.14	.35	3.52	10.14	11.75	19.20	13.53	2.49	.65	66.61
Max.	5.31	7.81	3.08	12.29	3.40	19.71	21.05	24.82	60.75	49.72	10.49	4.55	162.2
Min.	.08	.06	.05	.04	.04	.04	.11	1.28	6.37	1.00	.10	.09	21.03

TABLE 3

RUNOFF OF LINE-A CANAL NEAR FORT MYERS

Monthly and annual runoff, in thousands of acre-feet

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1944			20	15	32	82	71	5,560	2,180	3,330	468	29	
1945	49	12	2.6	0	0	4,360	14,900	6,210	6,290	1,430	189	15	33,460

During the time from May 1940 to December 1951 the maximum discharge observed was 2,890 cubic feet per second on September 12, 1940. The water elevation at the time was 12.45 feet above mean sea level; however, during the flood of June 15, 1936, a stage of 13.4 feet was reached, as evidenced by floodmarks. Low flows are not uncommon; however, the only time during the period mentioned above when there was no flow was from June 28 to July 3, 1940. A table of runoff in thousands of acre feet (Table 2) and a flow-duration curve (Fig. 8) have been included.

LINE-A CANAL

This canal runs south from Fort Myers to Mulock Creek, a distance of some 10 miles, and intercepts the flow out of Six Mile Cypress Slough on the east. A gaging station was operated on the canal from June 1942 to July 1948. Only stage information was collected except from February 1944 to December 1946, when flow data were also obtained. The datum of the gage was at mean sea level (levels by Corps of Engineers). During the period covered by discharge records the maximum flow was 567 cubic feet per second, on September 19, 1947. Extended periods of zero flow were recorded. A minimum gage height, on June 16, 1945, was 2.14 feet. Listed in Table 3 is the runoff in thousands of acre feet for Line-A Canal.

STILL LAKE

Still Lake, 15 miles east of Fort Myers, is a circular, water-filled, sinkhole 600 feet in diameter and 208 feet deep. It was investigated in May 1943 by the U.S. Geological Survey and determinations of water temperature, stage, and depth at various locations were made.

STAGE STATIONS

In addition to the records already discussed, records of stage have been collected on the Estero River at Estero, Mulock Creek near Estero, and Billy's Creek at Fort Myers. For station descriptions of all stations that have been operated in Lee County by the U.S. Geological Survey, see the appendix

TIME DISTRIBUTION

It is frequently as important to have information concerning the time distribution of the flow of streams as it is to know where the water is to be found. Even though the total yearly runoff for two particular streams may have been equal or nearly equal, the time at which various amounts of runoff occurred do not necessarily coincide.

The most important factor in producing the pattern of runoff is the seasonal distribution of the rainfall. In Florida the stream flow pattern follows the seasonal changes in rainfall more closely than in areas where snow is a factor. Figure 9 shows the seasonal variations in the average runoff of Orange River. The correlation may be noted by comparison with the variation in rainfall shown in Figure 3.

BASIC DATA REQUIREMENTS

In view of the rapid economic growth of Lee County, it is evident that more information on surface water resources is needed. The value of the records collected thus far would be increased by their continuance and by the operation of a program on a broader scope.

Essential to such a program would be the operation of additional index gaging stations on several of the larger streams and the periodic determination of the flow of the smaller streams. Periodic observations as well as the collection of daily stage and discharge data would contribute materially to knowledge of the hydrology of the county and at the same time provide information of economic value.

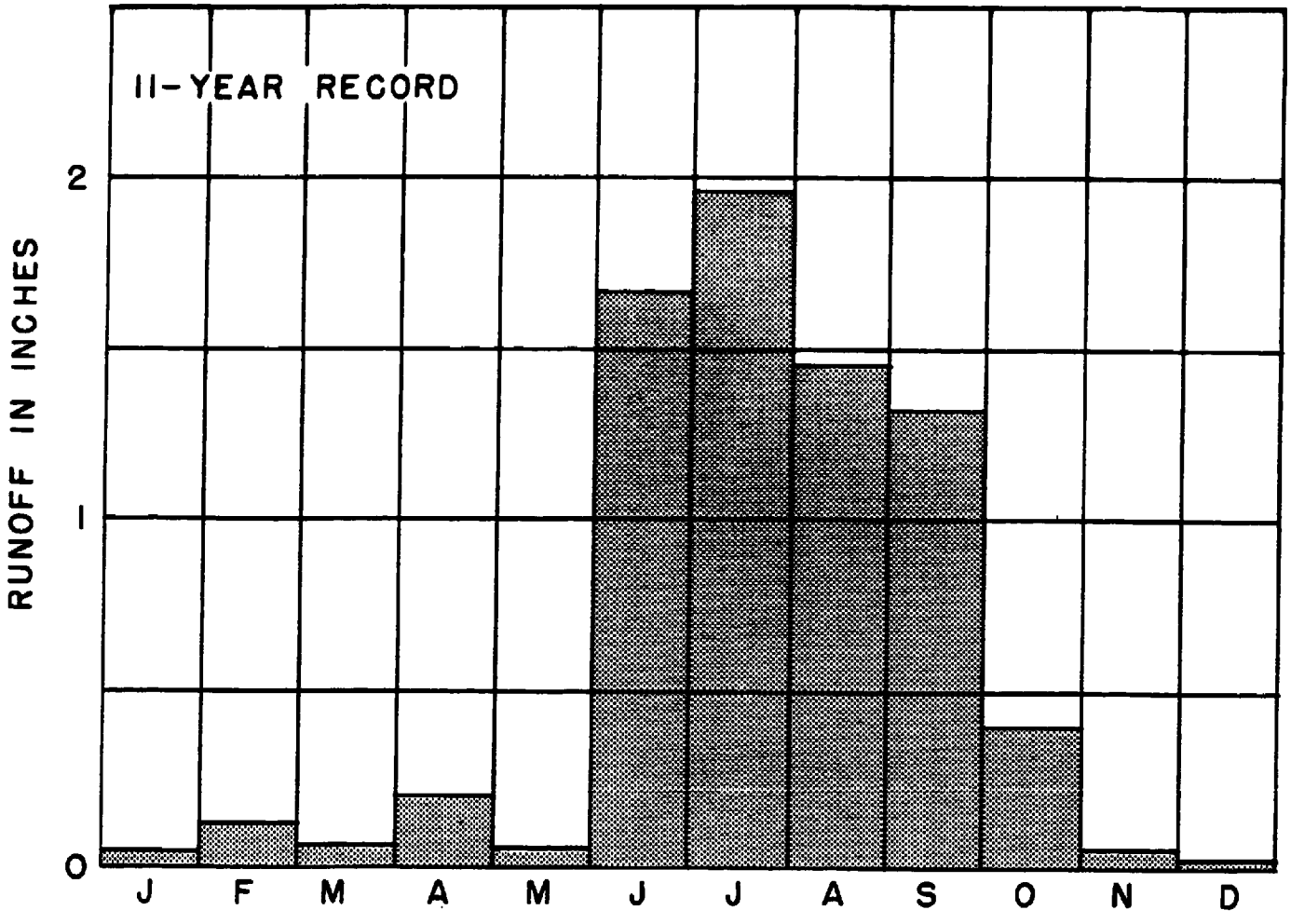

Fig. 9. Average runoff of Orange River near Fort Myers.

IMPERIAL RIVER NEAR BONITA SPRINGS

Location--Lat. 26°20', Long. 81°45', in Sec. 36, T. 47 S. R. 25 E., 1 1/2 miles east of Bonita Springs.

Records Available--May 1940 to December 1951, daily stage and discharge (continuing).

Gage--Water-stage recorder and wooden control. Datum of gage is at mean sea level, datum of 1929. Prior to Sept. 10, 1941, staff gage at same site and datum read once or twice daily.

Extremes--Maximum discharge observed, 2,890 cfs Sept. 12, 1940 (gage height, 12.45 ft.); no flow June 28 to July 3, 1940.

Flood of June 15, 1936, reached a stage of 13.4 ft., from floodmark.

MULOCK CREEK NEAR ESTERO

Location--Lat. 26°28'. Long. 81°50', in Sec. 18, T. 46 S., R. 25 E., 30 ft. upstream from U. S. Highway 41, 3 miles northwest of Estero.

Records Available--June 1942 to July 1948, daily stage (discontinued).

Gage--Water-stage recorder. Datum of gage is at mean sea level (levels by Corps of Engineers).

Extremes--June 1942 to July 1948: Maximum gage height, 6.98 ft. Sept. 18, 1947; minimum observed, -0.22 ft. Feb. 15, Mar. 8, 1943.

Flood of June 1936 reached a stage of about 9.0 ft., from information by local residents.

Remarks--Local residents state there is always some flow in stream. Stage affected by tide at low and medium flows.

ESTERO RIVER AT ESTERO

Location--Lat. 26°31', Long. 81°51', in Sec. 34, T. 46 S., R. 25 E., 230 ft. upstream from highway bridge, 0.8 mile east of Estero.

Records Available--June 1942 to July 1946, daily stage (discontinued).

Gage--Water-stage recorder. Datum of gage is at mean sea level (levels by Corps of Engineers).

Extremes--June 1942 to July 1946: Maximum gage height, 8.01 ft. Oct. 18, 1944; minimum observed, -0.88 ft. Dec. 14, 15, 1942.

Flood of June 1936 reached a stage of about 14.0 ft., from floodmark.

CALOOSAHATCHEE RIVER AT ALVA

Location--Lat. 26°43', Long. 81°36', in Sec. 27, T. 43 S., R. 27 E., 110 ft. downstream from highway bridge at Alva, 12.8 miles downstream from State Highway 29 at La Belle.

Records Available--October 1948 to December 1950, daily stage, occasional discharge (discontinued).

Gage--Water-stage recorder. Datum of gage is at mean sea level, datum of 1929.

Extremes--October 1948 to December 1950: Maximum gage height, 6.71 ft. Sept. 30, 1949; minimum -1.68 Dec. 24, 1949.

A stage of 13.3 ft. was reached in 1924, from information by local resident. A stage of -1.88 ft. occurred on Oct. 18, 1944, from records of Corps of Engineers. A discharge of 12,600 cfs was measured Oct. 1, 1948.

Remarks--Stage affected by tide. Regulation by Ortona Lock, 22 miles upstream from station, and by lock at Moore Haven.

LINE-A CANAL NEAR FORT MYERS

Location--Lat. 26°31', Long. 81°51', in Sec. 6, T. 46 S., R. 25 E., 1/4 mile upstream from U. S. Highway 41, 9 miles south of Fort Myers.

Records Available--June 1942 to February 1944, daily stage; February 1944 to December 1946, daily stage and discharge; January 1947 to July 1948, daily stage (discontinued).

Gage--Water-stage recorder and concrete control. Datum of gage is at mean sea level (levels by Corps of Engineers). Concrete control completed Feb. 5, 1944.

Extremes--Maximum discharge, 567 cfs Sept. 19, 1947 (gage height, 9.71 ft.); no flow at times; minimum gage height, 2.14 ft. June 16, 1945.

ORANGE RIVER NEAR FORT MYERS
(Previously published as Twelvemile Creek near Fort Myers)

Location--Lat. 26°40', Long. 81°43', in Sec. 9, T. 44 S., R. 26 E., 1 1/2 miles southeast of Buckingham and 8 miles northeast of Fort Myers.

Drainage Area--83.4 square miles.

Records Available--November 1935 to October 1946, daily stage and discharge (discontinued).

Gage--Staff gage read once or twice daily. Datum of gage is 1.71 ft. above mean sea level, datum of 1929.

Extremes--Maximum discharge, 5,300 cfs June 15, 1936 (gage height, 13.40 ft., from floodmarks), from rating curve extended above 2,800 cfs; no flow at times; minimum gage height, less than 0.02 ft. Apr. 18-22, 1939.

BILLY'S CREEK AT FORT MYERS

Location--Lat. 26°39', Long. 81°51', in Sec. 13, T. 44 S., R. 24 E., at First Street bridge in Fort Myers.

Records Available--February 1944 to December 1951, daily stage (continuing).

Gage--Water-stage recorder. Datum of gage is at mean sea level, datum of 1929.

Extremes--February 1944 to December 1951: Maximum gage height, 4.8 ft. Oct. 8, 1946, from floodmark; minimum, -1.77 ft. Oct. 18, 1944.

Flood in 1936 reached a stage of 4.5 ft. A low tide of -3.8 ft. occurred during a hurricane in 1935.

Remarks--Stage affected by tide with an average range of about 0.7 ft.

CALOOSAHATCHEE RIVER AT OLGA, NEAR FORT MYERS

Location--Lat. 26°43', Long. 81°43', in Sec. 21, T. 43 S., R. 26 E., 120 ft. downstream from State Highway 31, 0.45 mile north of Olga, and 6.5 miles downstream from Alva.

Records Available--October 1948 to December 1950, daily stage, occasional discharge (discontinued).

Gage--Water-stage recorder. Datum of gage is at mean sea level (levels by Corps of Engineers).

Extremes--October 1948 to December 1950: Maximum gage height, 4.60 Sept. 29, 1948; minimum -1.58 Dec. 24, 1949.

A stage of 8.2 ft. was reached in 1924, from information by local resident. A stage of -2.68 ft. occurred on Oct. 18, 1944, from records of Corps of Engineers.

Remarks--Stage affected by tide. Regulation by Ortona Lock, 28 miles upstream from station, and by Moore Haven Lock.

PART II

QUALITY OF SURFACE WATERS OF LEE COUNTY, FLORIDA

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INTRODUCTION

GENERAL

The history of the development of public water supplies in Lee County parallels that of many other coastal areas in southern Florida. In the early years, when the population was small, an ample supply of ground water was easily available from the artesian formations located at various depths between 100 and 1,200 feet below the land surface. Prior to 1935 the City of Fort Myers obtained its water supply from deep artesian wells penetrating the Hawthorn and Ocala formations. The water produced by these wells had a hardness of about 850 ppm, with high chloride, sulfate, hydrogen sulfide, and dissolved solids.

With a steady growth in population came a demand for more and better water. This demand has been caused not only by a rapidly increasing population, but also by greatly expanded industrial and agricultural enterprises. The tropical location of Fort Myers and Lee County is well suited for the growth of winter produce and citrus; many acres of gladioli have been planted within recent years. Also during the past few years the cattle industry has become of ever-increasing importance to this area and will contribute greatly to the future growth and development of the county.

Faced with the sometimes divergent requirements of the various interests concerned with the consumption, disposal, and regulation of water within the county, interested individuals, in cooperation with the Central and Southern Florida Flood Control District, organized the Lee County Water Resources and Conservation Committee. Members of this committee met in January 1953 and discussed at some length the county-wide problems of water supply and conservation, as well as certain local problems of special interest. It was the

conclusion of this committee that a report be prepared presenting all available data relating to the hydrology of Lee County and also setting forth deficiencies in hydrologic data and recommendations for remedial action. The following material has been assembled to assist in the preparation of its county-wide report.

PURPOSE AND SCOPE

This report does not attempt to do more than present very briefly the results of previous investigations of the chemical quality of surface waters in, or contributory to those of, Lee County, Florida. The quality of ground water is referred to only with respect to the possible contamination of surface waters by highly mineralized water from artesian aquifers.

On the basis of the analytical data presented, together with a limited discussion of the various surface water supplies included, certain recommendations are made which are believed necessary for an accurate appraisal of the hydrologic conditions in Lee County.

ACKNOWLEDGMENTS

This report was prepared by the U.S. Geological Survey in cooperation with the Central and Southern Florida Flood Control District, W. Turner Wallis, Secretary. It was prepared under the general supervision of S.K. Love, chief of the Quality of Water Branch, Washington, D.C. and the direct supervision of Eugene Brown, district chemist, Ocala, Florida.

The analytical data presented have been collected over a period of years by the U.S. Geological Survey in cooperation with the Central and Southern Florida Flood Control District, the cities of Fort Myers, Miami, Miami Beach, and Dade County.

PREVIOUS INVESTIGATIONS

In order to obtain information about the chemical quality of surface waters in and near Fort Myers, this city entered into a cooperative study with the U.S. Geological Survey in

early 1944. This study provided for the collection and laboratory examination of a series of water samples collected at selected points in and near the city of Fort Myers, as well as from most of the more important surface water supplies available to the county. Accordingly, from 1944 to 1946 samples were collected from the Caloosahatchee River, Orange River (Twelvemile Creek), Line-A Canal, Billy's Creek, Manuel's Branch, and other small creeks and drainage ditches. The results of chemical examination are given in tabular form in the appendix. Also included in these tables are results of chemical analyses of daily samples from the Caloosahatchee Canal at Moore Haven, and of other surface water supplies pertinent to this study. The location and type of sampling stations are shown in Figure 1.

Since there are no known published analyses of surface waters in Lee County, the following discussion of surface water quality is based entirely on the analytical data included in the appendix.

QUALITY OF SURFACE WATERS

CALOOSAHATCHEE CANAL AT MOORE HAVEN

The Caloosahatchee Canal is generally considered to be the canalized portion of the Caloosahatchee River system from Lake Okeechobee to Ortona Lock, while the portion from the latter point to the Gulf is known as the Caloosahatchee River.

Daily samples were taken from the Caloosahatchee Canal at Moore Haven from February 1941 to March 1942 and analyzed for alkalinity, specific conductance, and chloride. These daily samples were then composited at 10-day intervals for comprehensive chemical analysis. The results of these analyses are given in Table 1, appendix.

The minimum chloride value of 7.0 ppm was observed on Sept. 13, 1941 and the maximum of 53 ppm on Apr. 2, 1941. The average chloride concentration during this period was 30 ppm and the average hardness was 113 ppm. The analytical data obtained during this period indicate a water entirely

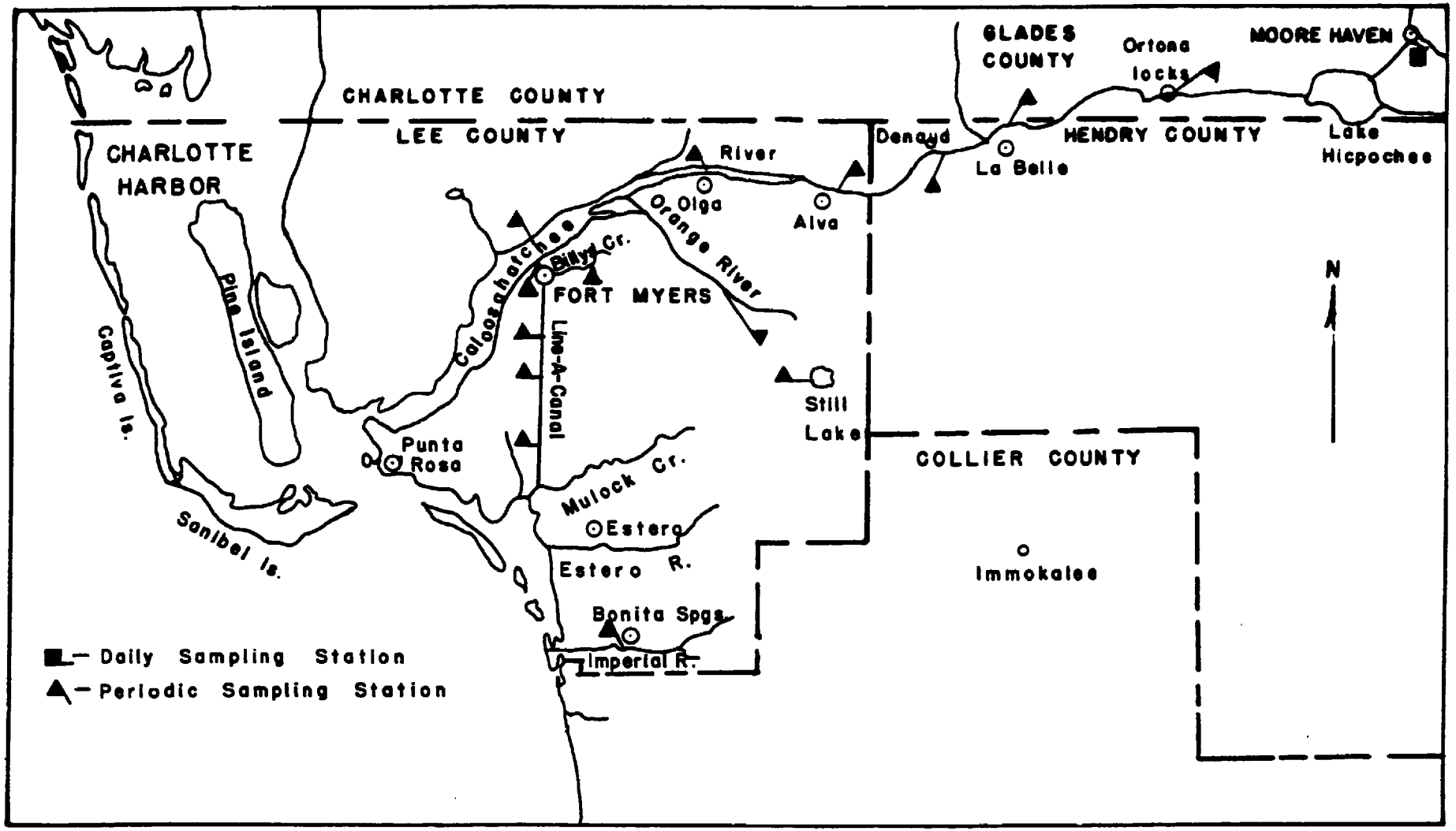

Figure 1. Map of Lee County, Florida, showing type and location of sampling stations.

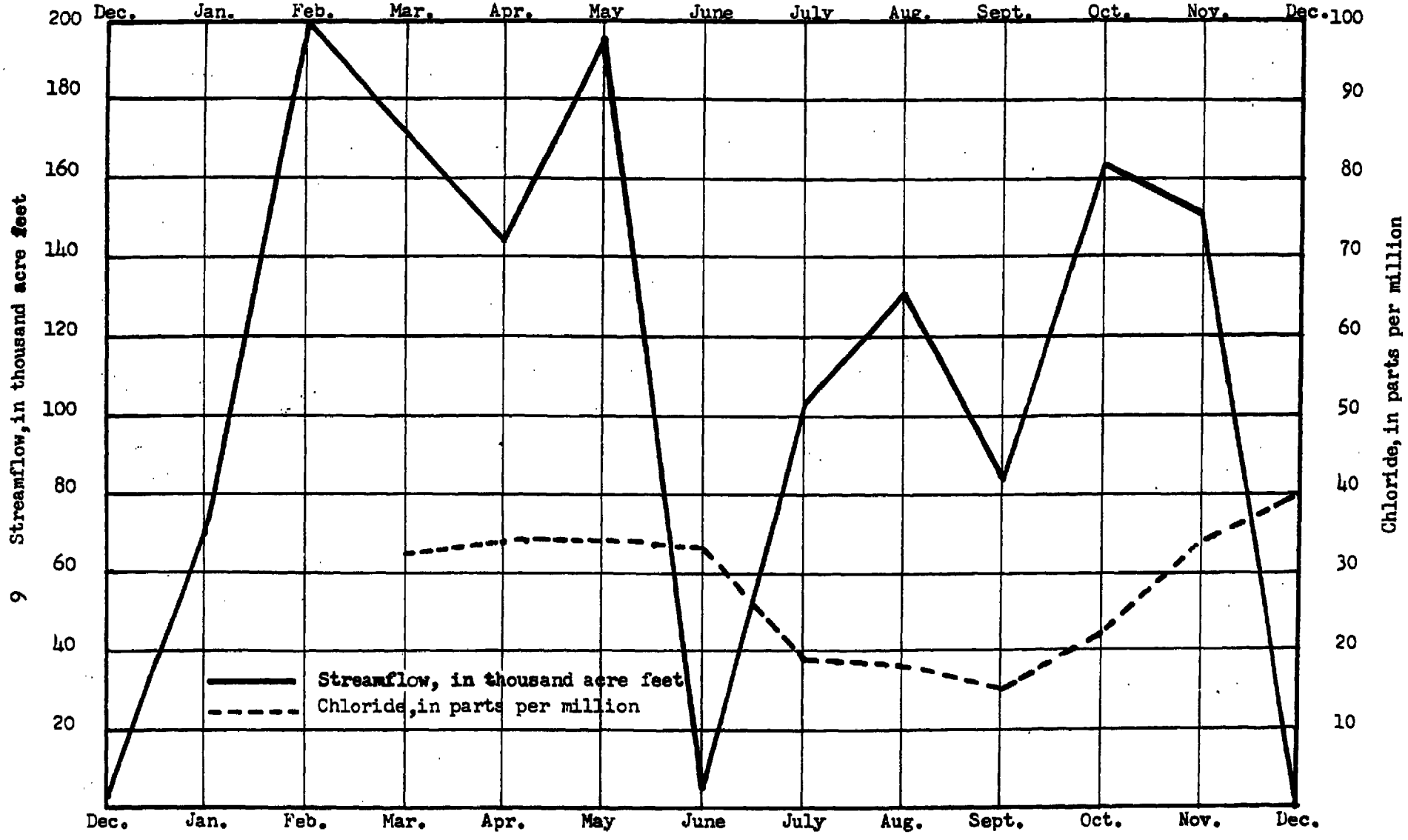

Figure 2. Average monthly chloride content and flow of Caloosahatchee Canal at Moore Haven, Florida, 1941.

Figure 3.--Annual mean discharge of Caloosahatchee Canal at Moore Haven, Florida.

suitable for agricultural use, but requiring color removal for domestic and most industrial purposes.

The annual variation in chemical quality is illustrated in Figure 2, which shows the average monthly chloride concentrations for the year 1941, as well as the streamflow in acre feet for the same period. Since the flow through the canal is regulated by the lock and dam structures at Moore Haven the quality of water discharged into the canal bears little relation to the flow. The rather uniform quality shown results from the "smoothing" effect of the large reservoir storage afforded by Lake Okeechobee. The chloride concentration is shown to be somewhat lower during the period June to October, as a result of dilution caused by heavy rainfall at this time of the year. Although Figure 2 presents a fairly good picture of the monthly variation in chloride content for a given year, it does not show how the concentration of this constituent may vary from year to year. It may be seen from Figure 3 that the year in which the analyses were made was one of high discharge through the canal. To the extent that this high discharge indicates a relatively "wet" year among those shown, an estimate may be made of the possible variation in chemical quality from year to year.

CALOOSAHATCHEE CANAL AT ORTONA LOCK

During the period February 1945 to April 1946 samples were taken from both upstream and downstream sides of the lock and analyzed for specific conductance and chloride. In addition periodic samples were taken for more complete chemical analysis. The results are given in Table 1 of the appendix. The chloride concentrations at both sides of the lock indicate that the water was not contaminated with sea water at the time the samples were collected.

It is impossible to compare the quality of water at Ortona Lock with that at Moore Haven on the basis of available data, since samples were not taken from the two locations during the same year. It is significant, however, to note that although the samples at Ortona Lock were taken during a relatively "dry" year, water of acceptable quality was observed. The average hardness at this location for the period February 1945 to April 1946 was 174 ppm and the average chloride was 36 ppm.

CALOOSAHATCHEE RIVER

As previously stated, the Caloosahatchee River proper is considered that portion of the river system between the Ortona Lock and the Gulf. The Caloosahatchee River is tidal at least as far inland as the Hendry County line and, as a result, contains varying amounts of salt water from the Gulf of Mexico, depending on the discharge of the river, tide stage and other climatic conditions, and the distance from the Gulf. There was, therefore, little incentive to conduct exhaustive chemical quality studies west of Ortona Lock, but rather to confine the study to periodic sampling at various points between the lock and Fort Myers. As would be expected, low chloride values were obtained during periods of high discharge through the Caloosahatchee Canal and high values during periods of low discharge. Table 2 in the appendix includes results of analyses of periodic samples collected at various points between Ortona Lock and the Gulf.

ORANGE RIVER

Orange River, or Twelve Mile Creek, as it is sometimes called, is the most important tributary to the Caloosahatchee River. The partial analyses of samples from Orange River, given in Table 3, indicate that this water is rather hard but would in all probability be quite suitable for public supply purposes if softened. Contamination by salt water was not indicated by any of the samples analyzed.

The period of sampling was not sufficiently long to indicate how the composition of the water would change during the year or from year to year, however, it is observed that considerable variation does occur depending on streamflow.

MISCELLANEOUS SURFACE SUPPLIES

Also included in Table 3 are results of analyses of samples taken from Billy's Creek, Line-A Canal, and other small creeks and ditches in Fort Myers; the analyses were made in order to determine the extent of contamination of surface waters by sea water and ground water. In most instances both top and bottom samples were taken to indicate the maximum chloride concentration present.

Wells in the Fort Myers area penetrating the artesian aquifers generally yield water containing in excess of 1,000 ppm chloride, while those withdrawing from the shallow unconfined aquifers usually yield water containing less than 50 ppm of chloride. The hardness of water from these shallow wells, generally less than 50 feet deep, approximates 300 ppm, and the iron content is apt to be quite high, as much as 3 ppm. A typical analysis of water from shallow wells in the Fort Myers area is given in Table 4 of the appendix. In general, the chloride content of water from the non-artesian aquifers differs very little from that of most uncontaminated surface waters found in the area. The occurrence of chloride contamination is readily apparent from an examination of the analyses for the miscellaneous surface water sources tabulated in Table 3. The large chloride concentrations found in samples collected near the Gulf and the Caloosahatchee River result most likely from sea-water penetration during high tides as well as from wind-blown spray. Sources more remote, such as Line-A Canal, probably owe their relatively high chloride values to drainage of areas irrigated by water from wells penetrating the deeper artesian aquifers. It is quite probable that the unconfined ground water in areas adjacent to these drainage canals may become contaminated by seepage from the canals during low ground-water levels.

CONCLUSIONS

Chemical examination of various surface water supplies in Lee County indicates the availability of water of sufficiently good quality to satisfy the requirements of agricultural, industrial, and domestic use after suitable treatment. The type and duration of sampling upon which this report is based was too limited to evaluate the supplies examined for any longer period than that actually included within the sampling period. Such an evaluation would require the initiation of a water analysis program in Lee County.

The number, type and location of sampling stations should be selected after a proper evaluation of the water requirements of the county, and should be maintained for as long a period of time as necessary to reflect the changes in water quality from year to year.

APPENDIX

TABLES OF CHEMICAL ANALYSES

TABLE 1

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, Feb. 12, Mar. 4-20, 1941

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
Feb. 12, 1941	3,990			30	6.3	13		76	16	35				101				140
Mar. 4, 1941	4,030							112		33						321		
Mar. 5	3,980							a133		30						337		
Mar. 6	3,860							116		33						336		
Mar. 7	3,680							119		34						336		
Mar. 8	3,780							121		33						341		
Mar. 9	4,110							116		31						326		
Mar. 10	3,930							112		33						342		
Mar. 4-10, Composite	3,910			36	9.0	19		118	26	31		0.6	180	127		335		90
Mar. 11	3,710	9.5		40	11	23		130	34	37		.5	256	145		375		95
Mar. 12	4,040	7.5		39	11	16		120	29	35		.3	245	143		340		90
Mar. 13	3,720	14		38	10	14		114	26	32		.3	240	136		327		95
Mar. 14	4,000	16		39	11	20		128	27	37		.3	255	143		349		80
Mar. 15	3,120	17		38	9.4	17		114	30	32		.3	235	133		314		95
Mar. 16	3,980	16		37	11	16		116	33	31		.3	240	138		318		90
Mar. 17	3,810	11		37	9.6	15		114	26	31		.3	225	132		310		100
Mar. 18	4,120	10		37	10	15		110	30	32		.3	223	133		310		105
Mar. 19	3,620	19		35	9.1	19		112	27	32		.3	231	125		315		100
Mar. 20	3,610	14		38	9.4	14		112	25	33		.3	240	133		320		100
Mar. 11-20, Composite	3,773	13		38	10	17		117	29	33		.3	b198	136		328		95

a Includes equivalent of 16 parts per million Carbonate (CO_3).

b Value reported is sum of determined constituents; other entries are residue on evaporation.

TABLE 1--Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, Mar. 21 to Apr. 10, 1941

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$		Specific Conductance (micromhos at 25°C)	pH	Color
														Ca & Mg	NCH			
Mar. 21, 1941	2,610							124		33						337		
Mar. 22	3,490							112		31						312		
Mar. 27	---							116		33						320		
Mar. 28	---							115		31						320		
Mar. 21-22, 27-28 Composite				32	10	21		118	23	32		0.2	b176	121		322		95
Apr. 1	724							190		47						556		
Apr. 2	---							192		53						554		
Apr. 3	---							189		51						546		
Apr. 4	---							169		41						460		
Apr. 5	---							136		35						374		
Apr. 6	---							136		36						374		
Apr. 7	---							185		48						524		
Apr. 8	---							85		24						242		
Apr. 9	---							81		24						233		
Apr. 10	---							90		23						218		
Apr. 1-10, Composite				47	10	24		144	35	39		.6	b227	158		414		100

Note.--Days for which no discharge is shown, flow consists of leakage and lockage (about 10 cfs).

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, Apr. 11-30, 1941

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na) Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
Apr. 11, 1941	---						87		25						249		
Apr. 12	2,660						66		23						200		
Apr. 13	2,380						126		29						287		
Apr. 14	3,970						120		31						335		
Apr. 15	3,820						102		28						289		
Apr. 16	3,660						121		30						326		
Apr. 17	3,730						115		28						316		
Apr. 18	3,470						108		23						301		
Apr. 19	3,750						105		29						303		
Apr. 20	3,980						113		31						323		
Apr. 11-20, Composite				35	7.5	14	104	22	28		0.4	b158	118		299		120
Apr. 21	4,040						122		32						315		
Apr. 22	4,320						87		26						237		
Apr. 23	3,820						117		33						337		
Apr. 24	3,930						120		33						322		
Apr. 25	3,920						126		35						358		
Apr. 26	3,770						127		37						362		
Apr. 27	4,160						120		36						360		
Apr. 28	4,160						115		36						333		
Apr. 29	4,380						120		36						335		
Apr. 30	4,120						132		36						350		
Apr. 21-30, Composite	4,062			34	9.8	24	118	29	34		2.0	b191	125		331		120

b Value reported is sum of determined constituents.

TABLE 1--Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, May 1 to May 20, 1941

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F')	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$		Specific Conductance (micromhos at 25°C)	pH	Color
														Ca & Mg	NCH			
May 1, 1941	4,890							137		37						368		
May 2	4,350							130		37						362		
May 3	3,920							132		35						350		
May 4	3,870							125		35						342		
May 5	4,120							120		38						361		
May 6	3,720							132		39						366		
May 7	3,650							130		39						371		
May 8	1,400							91		27						261		
May 9	1,900							101		30						285		
May 10	3,210							118		33						327		
May 1-10, Composite	3,503							---		--						---		
May 11	2,680							118		34						333		
May 12	3,820							118		34						331		
May 13	3,720							118		33						332		
May 14	3,400							137		43						409		
May 15	---							99		33						299		
May 16	3,070							71		25						220		
May 17	3,750							126		38						363		
May 18	3,930							118		35						336		
May 19	3,730							125		37						358		
May 20	3,970							118		36						343		
May 11-20, Composite				35	9.2	19		114	24	33		0.3	b177	125		335		70

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, May 21 to June 10, 1941

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
May 21, 1941	3,450							121		37						356		
May 22	3,930							120		37						354		
May 23	3,870							126		37						365		
May 24	3,900							122		37						361		
May 25	3,840							124		37						354		
May 26	3,620							112		34						334		
May 27	3,490							124		38						355		
May 28	3,350							124		37						362		
May 29	1,810							101		33						304		
May 30	---							101		33						305		
May 31	---							101		34						306		
May 21-31, Composite				34	8.7	21		116	21	35		0.3	b177	121		342		60
June 1	---							104		33						308		
June 2	---							105		34						308		
June 4	---							103		33						308		
June 5	---							104		35						314		
June 6	---							112		35						337		
June 7	---							112		36						331		
June 8	---							107		34						319		
June 9	---							107		34						313		
June 10	---							106		34						307		
June 1-10, Composite				32	8.7	19		108	20	34		.3	b167	116		316		50

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, June 11-30, 1941

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$		Specific Conductance (micromhos at 25° C)	pH	Color
														Ca & Mg	NCH			
June 11, 1941	---							113		33						318		
June 12	---							113		33						317		
June 13	---							110		34						322		
June 14	---							111		33						316		
June 15	---							105		33						312		
June 16	---							116		36						321		
June 17	---							112		33						313		
June 18	---							112		33						317		
June 19	1,010							110		33						314		
June 20	820							122		34						316		
June 11-20, Composite				30	8.6		22	110	20	33		0.2	b168	110		316		45
June 21	---							112		32						319		
June 22	---							110		34						316		
June 26	---							100		33						297		
June 27	---							99		33						301		
June 28	---							101		34						305		
June 29	---							102		34						308		
June 30	---							104		33						306		
June 21-22, June 26-30, Composite				28	8.1		21	103	17	33		.2	b158	103		305		50

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, July 1-20, 1941

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na) Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
July 1, 1941	---						110		31						311		
July 2	---						97		26						273		
July 3	---						91		23						261		
July 4	---						86		26						251		
July 5	---						63		21						194		
July 6	---						49		17						145		
July 7	---						40		13						117		
July 8	---						46		13						121		
July 9	---						51		11						128		
July 10	---						51		13						133		
July 1-10, Composite				21	4.2	11	68	9.1	20		0.7	b100	70		192		140
July 11	---						56		13						139		
July 12	---						59		14						144		
July 13	---						60		13						149		
July 14	840						63		12						154		
July 15	1,560						165		41						489		
July 16	880						70		15						193		
July 17	742						46		9						116		
July 18	1,790						30		7						78		
July 20	2,690						100		20						270		
July 11-20, Composite				23	3.6	11	72	13	16		.8	b104	72		193		200

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, July 21 to Aug. 10, 1941

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$		Specific Conductance (micromhos at 25°C)	pH	Color
														Ca & Mg	NCH			
July 21, 1941	2,950							98		21						262		
July 22	4,720							98		19						256		
July 23	4,050							48		11						126		
July 24	2,420							94		21						257		
July 26	2,890							84		19						230		
July 27	4,880							96		21						256		
July 28	4,090							88		19						230		
July 29	3,930							96		23						272		
July 30	4,120							89		21						254		
July 31	4,040							107		26						302		
July 21-31, Composite	3,809			28	5.8	13		90	18	21		0.4	b130	94		246		170
Aug. 2	4,150							101		26						292		
Aug. 3	3,930							110		29						326		
Aug. 4	4,040							100		27						290		
Aug. 5	3,810							109		27						313		
Aug. 6	4,230							94		26						272		
Aug. 7	4,140							99		26						283		
Aug. 8	4,030							113		31						326		
Aug. 9	3,820							102		26						296		
Aug. 10	3,820							113		28						320		
Aug. 2-10, Composite	3,996			32	7.8	18		105	25	27		.4	b162	112		302		180

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, Aug. 11-31, 1941

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
Aug. 11, 1941	4,140							95		24						276		
Aug. 12	4,270							104		26						301		
Aug. 13	4,350							110		28						320		
Aug. 17	2,250							92		23						263		
Aug. 18	---							98		25						276		
Aug. 19	---							51		15						152		
Aug. 20	---							50		14						150		
Aug. 11-20, Composite				26	6.9	12		85	17	22		0.4	b126	93		247		200
Aug. 21	---							57		15						160		
Aug. 22	---							59		15						160		
Aug. 23	---							47		13						142		
Aug. 24	---							45		14						134		
Aug. 25	---							38		12						112		
Aug. 26	---							39		12						115		
Aug. 27	---							41		12						117		
Aug. 28	---							41		12						121		
Aug. 29	---							45		12						129		
Aug. 30	---							42		11						119		
Aug. 31	---							40		12						120		
Aug. 21-31, Composite				14	3.1	6.1		45	5.2	13		.4	b 64	48		130		240

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, Sept. 1-20, 1941

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$		Specific Conductance (micromhos at 25° C)	pH	Color
														Ca & Mg	NCH			
Sept. 1, 1941	---							40		11						113		
Sept. 2	---							37		9						104		
Sept. 3	---							31		10						91		
Sept. 4	---							28		9.5						80		
Sept. 5	---							22		9.0						70		
Sept. 6	---							22		9.0						69		
Sept. 7	---							22		9.0						68		
Sept. 8	---							24		8.5						68		
Sept. 9	---							24		9.5						71		
Sept. 10	---							24		9.5						68		
Sept. 1-10, Composite				8.1	1.8	4.3		27	1	9.5		0.5	b38	28		80		240
Sept. 11	---							22		8.0						63		
Sept. 12	---							23		7.5						67		
Sept. 13	---							21		7.0						63		
Sept. 14	---							24		7.5						65		
Sept. 15	---							25		7.5						68		
Sept. 16	---							28		7.5						70		
Sept. 17	---							22		7.0						65		
Sept. 18	2,850							26		8.0						64		
Sept. 19	4,280							42		10						117		
Sept. 20	3,560							86		22						240		
Sept. 11-20, Composite								32	3.9	10						92		180

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, Sept. 21-29, Oct. 5-20, 1941

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$		Specific Conductance (micromhos at 25° C)	pH	Color
														Ca & Mg	NCH			
Sept. 21, 1941	2,830							76		23						233		
Sept. 22	3,090							76		18						209		
Sept. 23	2,440							78		18						212		
Sept. 24	2,800							75		18						209		
Sept. 25	2,910							92		22						260		
Sept. 26	3,460							93		22						247		
Sept. 27	3,940							88		24						244		
Sept. 28	4,430							87		23						233		
Sept. 29	3,520							87		23						236		
Sept. 21-29, Composite	3,268			24	6.4	9.8		81	12	20		0.6	b113	86		233		110
Oct. 5	1,640							92		25						257		
Oct. 14	---							46		15						107		
Oct. 15	---							34		15						114		
Oct. 16	---							40		16						131		
Oct. 17	---							44		16						136		
Oct. 18	---							38		14						125		
Oct. 19	---							44		18						128		
Oct. 20	---							36		14						110		
Oct. 5-20, Composite				14	3.4	6.9		45	1.4	18		.2	b 66	49		138		190

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, Oct. 21 to Nov. 10, 1941

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$		Specific Conductance (micromhos at 25° C)	pH	Color
														Ca & Mg	NCH			
Oct. 21, 1941	2,650							35		14						111		
Oct. 23	4,400							98		24						276		
Oct. 24	3,280							104		29						301		
Oct. 25	3,090							108		29						304		
Oct. 26	4,250							108		29						315		
Oct. 27	4,150							102		28						292		
Oct. 28	4,300							101		28						292		
Oct. 29	4,440							108		27						295		
Oct. 30	4,170							103		28						282		
Oct. 31	4,590							106		29						306		
Oct. 21-31, Composite	3,932			30	7.5	13		98	16	26		0.4	b141	106		279		110
Nov. 1	3,630							106		29						297		
Nov. 2	4,260							118		31						329		
Nov. 3	4,090							122		32						342		
Nov. 4	3,970							118		34						337		
Nov. 5	3,930							112		31						325		
Nov. 6	4,090							118		35						339		
Nov. 7	3,830							110		29						313		
Nov. 8	4,270							116		33						340		
Nov. 9	3,890							112		32						333		
Nov. 10	3,800							122		34						358		
Nov. 1-10, Composite	3,976			36	9.2	16		114	23	32		.4	b173	128		334		80

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, Nov. 11-30, 1941

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
Nov. 11, 1941	4,270							104		32						314		
Nov. 12	3,910							103		31						304		
Nov. 13	4,180							108		33						328		
Nov. 14	4,120							106		33						307		
Nov. 15	3,900							106		31						301		
Nov. 16	4,500							116		33						328		
Nov. 17	4,240							102		31						300		
Nov. 18	4,060							81		26						243		
Nov. 20	---							111		32						319		
Nov. 11-20, Composite				31	7.9	19		104	20	31		0.4	b160	110		306		100
Nov. 21	---							110		32						316		
Nov. 23	---							77		26						235		
Nov. 26	---							154		38						411		
Nov. 28	---							152		42						435		
Nov. 29	---							152		43						445		
Nov. 30	---							151		45						436		
Nov. 21-30, Composite				40	9.9	23		133	28	37		.5	b204	141		381		90

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, Dec. 2-20, 1941

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$		Specific Conductance (micromhos at 25°C)	pH	Color
														Ca & Mg	NCH			
Dec. 2, 1941	---							152		38						406		
Dec. 3	---							158		41						427		
Dec. 4	---							156		39						428		
Dec. 5	---							157		43						430		
Dec. 6	---							157		41						430		
Dec. 7	---							154		39						420		
Dec. 8	---							152		38						410		
Dec. 9	---							152		41						432		
Dec. 10	---							152		40						422		
Dec. 2-10, Composite				46	12	22		154	30	39		0.4	b225	164		424		70
Dec. 12	---							152		40						419		
Dec. 13	---							145		38						394		
Dec. 14	---							153		41						425		
Dec. 15	---							172		44						462		
Dec. 16	---							161		42						445		
Dec. 17	---							153		42						427		
Dec. 18	---							154		41						427		
Dec. 19	---							168		44						460		
Dec. 20	---							172		44						462		
Dec. 12-20, Composite				47	12	25		159	32	41		.5	b236	167		437		70

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, Dec. 21, 1941 to Jan. 19, 1942

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na) Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$		Specific Conductance (micromhos at 25°C)	pH	Color
													Ca & Mg	NCH			
Dec. 21, 1941	---						163		41						458		
Dec. 22	---						144		37						399		
Dec. 23	---						150		39						419		
Dec. 24	---						164		44						457		
Dec. 25	---						145		38						399		
Dec. 21-25, Composite				45	12	26	153	33	41		0.4	b233	162		430		70
Jan. 7, 1942	---						146		35						390		
Jan. 8	---						145		37						389		
Jan. 9	---						146		37						392		
Jan. 10	---						141		39						399		
Jan. 7-10, Composite				41	13	20	143	30	36		.4	b211	156		397		70
Jan. 11	---						139		39						399		
Jan. 12	---						138		39						398		
Jan. 13	---						142		38						389		
Jan. 14	---						144		38						387		
Jan. 15	---						140		40						382		
Jan. 16	---						140		39						381		
Jan. 18	---						140		36						378		
Jan. 19	---						143		39						383		
Jan. 11-19, Composite				38	11	27	143	25	39		.4	b211	140		389		60

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, Jan. 22 to Feb. 10, 1942

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$		Specific Conductance (micromhos at 25°C)	pH	Color
														Ca & Mg	NCH			
Jan. 22, 1942	1,530							142		38						388		
Jan. 23	2,800							141		36						384		
Jan. 24	2,280							142		38						397		
Jan. 25	3,290							117		35						333		
Jan. 26	3,270							96		30						283		
Jan. 27	2,100							98		30						280		
Jan. 28	1,890							97		31						281		
Jan. 29	2,750							108		31						307		
Jan. 30	3,560							85		28						261		
Jan. 31	3,740							115		30						325		
Jan. 22-31, Composite	2,721			30	7.6	25		114	19	34		0.2	b172	106		324		90
Feb. 1	1,690							124		33						348		
Feb. 6	2,890							90		29						269		
Feb. 8	2,770							100		31						287		
Feb. 9	2,120							88		29						262		
Feb. 10	---							38		24						158		
Feb. 1-10, Composite				26	6.1	18		88	16	29		.1	b138	90		266		110

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT MOORE HAVEN, FLA.

Chemical analyses, in parts per million, Feb. 11-27, 1942

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na) Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
Feb. 11, 1942	---						43		23						150		
Feb. 12	---						38		23						147		
Feb. 13	---						111		31						308		
Feb. 14	---						113		30						309		
Feb. 15	---						109		30						302		
Feb. 16	---						110		30						306		
Feb. 17	---						104		30						291		
Feb. 18	---						104		29						289		
Feb. 19	---						111		31						304		
Feb. 20	---						123		32						317		
Feb. 11-20, Composite				28	7.1	18	97	15	30		0.1	b146	99		274		90
Feb. 21	---						123		31						318		
Feb. 22	---						123		33						320		
Feb. 23	---						121		31						315		
Feb. 24	---						121		32						315		
Feb. 25	---						128		35						327		
Feb. 26	1,470						128		32						332		
Feb. 27	4,220						133		35						355		
Feb. 21-27, Composite				33	8.2	23	128	15	33		.1	b175	116		326		60
For period Mar. 4, 1941 to Feb. 27, 1942																	
Maximum.	4,890			47	13	27	192	35	53		2.0	b236	167		556		240
Minimum	724			8.1	1.8	4.3	21	1	7.0		.1	b 38	28		63		45
Average				32	18	8.0	107	20	30		.4	d160	113		297		111

b Value reported is sum of determined constituents.

d Values for Mar. 4-10, 1941 composite and Mar. 11-20, 1941 dailies not included in average.

TABLE 1--Continued

CALOOSAHATCHEE CANAL AT ORTONA LOCK, NEAR FORT MYERS, FLA.

Chemical analyses, in parts per million

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
Upstream side of lock Feb. 22, 1945 (Integrated)			0.02	47	15	58		222	38	59		1.2	b328	179		608	7.3	55
Mar. 28 (Integrated)				49	15	46		204	34	58		.1	b303	184		576	7.1	50
Mar. 28								212		57		.8				576	7.4	50
May 3										59						534		
Aug. 9										21						284		
Aug. 14										26						367		
Aug. 22 (Integrated)				62	11	26		192	40	39		.4	b273	200		492	7.2	320
Aug. 22										38						506		
Aug. 29										24						341		
Sept. 4										27						325		
Sept. 12										21						321		
Sept. 21										6.0						109		
Nov. 21 (Integrated)				44	7.6	13		140	17	26		1.0	b178	141		346	7.1	120
Nov. 21										26						338		
Nov. 28										30						427		

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT ORTONA LOCK, NEAR FORT MYERS, FLA.

Chemical analyses, in parts per million

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na) Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
Upstream side of lock -- continued																	
Dec. 5, 1945									34						492		
Dec. 12									30						364		
Dec. 19 (Integrated)				48	10	20	155	25	36		0.8		161		421	7.2	100
Dec. 19									36						452		
Dec. 26									38						498		
Jan. 3, 1946									28						336		
Jan. 9									30						353		
Jan. 16 (Integrated)				40	9.9	21	137	26	33		.7	b198	140		372	7.2	120
Jan. 16									30						374		
Jan. 22									34						375		
Jan. 29									34						404		
Feb. 5									36						436		
Feb. 12 (Integrated)				56	11	23	192	21	38		.6		184		499		90
Feb. 12									38						484		
Feb. 19									39						486		
Feb. 26									41						514		
Mar. 5									43						525		
Mar. 13 (Integrated)				60	12	30	204	32	45		.5		199		525		82
Mar. 13									44						510		
Mar. 19									36						389		
Mar. 26									36						400		

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT ORTONA LOCK, NEAR FORT MYERS, FLA.

Chemical analyses, in parts per million

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$		Specific Conductance (micromhos at 25°C)	pH	Color
														Ca & Mg	NCH			
Upstream side of lock -- continued																		
Apr. 2, 1946										38						413		
Apr. 10										36						411		
For period Feb. 22, 1945 to Apr. 10, 1946																		
Maximum				62	15		58	222	40	59		1.2	b328	200		608	7.5	320
Minimum				40	7.6		13	137	17	6.0		.1	b178	140		109	7.1	50
Average				51	11.4		30	184	29	36		.7	b256	174		426	7.3	110
Mar. 31, 1953				39	9.7		28	131	39	35		1.0	b216	137	30	376	7.6	30

b Value reported is sum of determined constituents.

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT ORTONA LOCK, NEAR FORT MYERS, FLA.

Chemical analyses, in parts per million

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
Downstream side of lock (all bottom samples)																		
Aug. 9, 1945										22						334		
Aug. 14										25						351		
Aug. 22										34						497		
Aug. 29										26						353		
Sept. 4										24						318		
Sept. 12										23						363		
Sept. 21										7.0						124		
Nov. 21										28						353		
Nov. 28										42						477		
Dec. 5										34						493		
Dec. 12										30						381		
Dec. 19										36						466		
Dec. 26										40						513		
Jan. 3, 1946										42						395		
Jan. 9										30						350		
Jan. 16										32						392		
Jan. 22										34						424		
Jan. 29										34						424		

TABLE 1 -- Continued

CALOOSAHATCHEE CANAL AT ORTONA LOCK, NEAR FORT MYERS, FLA.

Chemical analyses, in parts per million

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$		Specific Conductance (micromhos at 25°C)	pH	Color
														Ca & Mg	NCH			
Downstream side of lock (all bottom samples)																		
Feb. 5, 1946										34						448		
Feb. 12										37						484		
Feb. 19										39						501		
Feb. 26										40						520		
Mar. 5										42						537		
Mar. 13										44						534		
Mar. 19										36						385		
Mar. 26										36						394		
Apr. 2										37						409		
Apr. 10										37						415		
Mar. 31, 1953				40	9.3	28		133	39	35		.9	b217	138	29	375	7.6	35
For period Aug. 9, 1945 to Apr. 10, 1946																		
Maximum										44						537		
Minimum										7.0						124		
Average										33						416		

TABLE 2

CALOOSAHATCHEE RIVER NEAR FORT MYERS, FLA.

Chemical analyses, in parts per million

Date of Collection	Estimated Velocity (ft. per sec.)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
AT LABELLE																		
May 8, 1945	a 1/2									c 50								
Aug. 9										24						388		
Nov. 27										34						561		
AT DENAUD																		
May 8, 1945										c 50								
Aug. 9										28						388		
Nov. 27										38						562		
Mar. 31, 1953				40	9.3	30		136	41	35		0.9	b223	138	27	378	7.6	45
AT ALVA																		
May 8, 1945										c 4,500								
Aug. 9										33						400		
Nov. 27										52						591		
Mar. 31, 1953				41	9.2	30		137	40	36		.9	b224	140	28	384	7.6	50
AT OLGA																		
May 8, 1945	1/4									c 8,800								
Aug. 9										32						363		
Nov. 27										56						597		
Mar. 31, 1953				40	9.8	29		135	40	36		.8	b222	140	30	382	7.6	28

a Direction of flow was upstream, all other flows given are downstream.

b Value reported is sum of determined constituents.

c Approximate chloride content, in parts per million, from conductivity measurements.

TABLE 2--Continued

CALOOSAHATCHEE RIVER NEAR FORT MYERS, FLA.

Chemical analyses, in parts per million

Date of Collection	Estimated Velocity (ft. per sec.)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$		Specific Conductance (micromhos at 25°C)	pH	Color
														Ca & Mg	NCH			
AT U.S. HWY. 41 IN FORT MYERS																		
May 8, 1945	slight									c15,000								
Mar. 31, 1953				42	12	47		143	45	65		0.9	b282	154	38	496	7.8	32

b Value reported is sum of determined constituents.

c Approximate chloride content, in ppm, from conductivity measurements.

TABLE 3

MISCELLANEOUS SURFACE WATERS IN LEE COUNTY

Chemical analyses, in parts per million

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$		Specific Conductance (micromhos at 25°C)	pH	Color
														Ca & Mg	NCH			
ORANGE RIVER NEAR FORT MYERS																		
Dec. 16, 1939			0.08	93	20	27		351	18	47		---	b378	314		684	---	---
Feb. 3, 1944	4.2			82	14	7.1		262	13	35		0.2	b280	262		574	7.9	37
Mar. 4	2.0									34								
Apr. 6	4.2									38								
May 5	3.6			84	13	16		277	14	37		.6	b301	263		662	7.6	38
June 7	4.9									35								
July 4	4.9									37								
Aug. 22	38			36	5.5	4.6		116	5	16		.1	b124	112		245	7.0	70
Oct. 11	3.5									31						535		
Nov. 16	3.1									31						539		
Jan. 10, 1945	5.0									36						535		
Feb. 22	.95									33						482		
Mar. 28	.38									35						456		
May 3	.01									40						361		
For period Feb. 1944 to May 1945																		
Maximum				84	14	16		277	14	40		.6	b301	263		662	7.9	70
Minimum				36	5.5	4.6		116	5	16		.1	b124	112		245	7.0	37
Average				67	10.8	9.2		218	11	34		.3	b252	212		488	7.5	48
Mar. 31, 1953 (at State Hwy. 80)				42	10	38		138	42	50		.7	b247	166	53	434	7.8	45

b Value reported is sum of determined constituents.

TABLE 3 -- Continued

MISCELLANEOUS SURFACE WATERS IN LEE COUNTY

Chemical analyses, in parts per million

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
BILLY'S CREEK													(b)					
at Nuna Ave.																		
Feb. 3, 1944				126	28	222		330	55	415			1,010	430		1,240	7.7	35
at Palmetto Ave.																		
Feb. 3, 1944				128	52	224		256	149	465			1,140	534		2,110	7.5	37
Mar. 3										990								
Apr. 5										422								
May 5 (top)				152	116	657		199	305	1,280			2,610	856		4,730	7.2	30
June 6										360								
July 6										690								
Aug. 24 (bottom)										136						847		
Oct. 12 (bottom)										480						2,140		
Nov. 16 (bottom)										560						2,410		
Jan. 12, 1945 (bottom)										455						2,120		
Feb. 24 (top)										825						3,250		
Feb. 24 (bottom)										855						3,380		
Mar. 30 (top)										650						2,770		
Mar. 30 (bottom)										1,190						4,310		
May 5 (bottom)										4,850						13,800		

b Values reported are sum of determined constituents.

TABLE 3 -- Continued

MISCELLANEOUS SURFACE WATERS IN LEE COUNTY

Chemical analyses, in parts per million,

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$: Ca & Mg	Hardness as $CaCO_3$: NCH	Specific Conductance (micromhos at 25°C)	pH	Color
BILLY'S CREEK (Continued)																		
at 1st Street																		
Feb. 3, 1944 (top)								174		10,200						29,500	7.3	32
Feb. 3 (bottom)								164		11,800						33,600	7.4	25
Mar. 3 (top)										12,100								
Mar. 3 (bottom)										13,800								
Apr. 5 (top)										9,810								
Apr. 5 (bottom)										11,400								
May 5 (top)								150		15,100						41,400	7.3	24
May 5 (bottom)								148		15,000						41,400	7.4	25
June 7 (top)										3,920								
June 7 (bottom)										13,700								
July 6 (top)										10,100								
July 6 (bottom)										10,200								
Aug. 24 (top)										1,540						5,430		
Oct. 12 (top)										4,420						14,200		
Oct. 12 (bottom)										6,050						19,000		
Nov. 16 (top)										5,250						16,300		
Nov. 16 (bottom)										8,950						26,300		
Jan. 12, 1945 (top)										3,400						11,100		
Jan 12 (bottom)										10,900						31,500		

TABLE 3 -- Continued

MISCELLANEOUS SURFACE WATERS IN LEE COUNTY

Chemical analyses, in parts per million

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
BILLY'S CREEK (Continued)																		
at 1st Street (Continued)													(b)					
Feb. 24, 1945 (top)										5,930						18,100		
Feb. 24 (bottom)										11,600						33,100		
Mar. 30 (top)										9,620						23,400		
Mar. 30 (bottom)										13,900						30,500		
May 5 (top)										9,270						22,800		
May 5 (bottom)										14,200						31,300		
DITCH AT MICHIGAN AND PALMETTO AVE.																		
Feb. 3, 1944				132	91	146		186	286	405			1,150	704		3,290	7.1	33
May 5 (top)				136	93	449		189	304	870			1,950	722		3,410	7.2	27
CREEK AT MICHIGAN AVE. AND CEMETERY																		
Feb. 3, 1944 (bottom)				130	29	143		262	76	328			834	444		1,580	7.5	30
May 5 (top)				126	31	172		259	92	360		0.1	909	442		1,670	7.3	30
Mar. 3 (top)										460								
Apr. 5 (top)										550								
June 6 (top)										310								
July 6 (top)										305								
Aug. 24 (top)										330						1,640		

b Values reported are sum of determined constituents.

TABLE 3 -- Continued

MISCELLANEOUS SURFACE WATERS IN LEE COUNTY

Chemical analyses, in parts per million

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
CREEK AT MICHIGAN AVENUE AND CEMETERY (Continued)												(b)	(b)					
Oct. 12, 1944 (top)										385						1,830		
Nov. 16 (top)										412						1,980		
Jan. 12, 1945 (top)										570						2,480		
Feb. 24 (top)										328						1,580		
Mar. 30 (top)										355						1,660		
May 5 (top)										385						1,800		
A.C.L. RAILROAD DITCH AT 2ND STREET																		
Feb. 3, 1944				95	51	233		166	216	420			1,100	446		1,950	7.2	112
May 4				97	58	277		132	256	502		0.0	1,260	480		2,220	7.0	75
LINE A CANAL NEAR FORT MYERS at Page Field																		
Feb. 3, 1944				126	104	442		164	335	865			1,950	742		3,430	7.4	8
Apr. 5										850								
May 4				123	108	450		149	345	885			1,980	751		3,520	7.7	12
June 6										855								
July 8										890								

b Values reported are sum of determined constituents.

TABLE 3-- Continued

MISCELLANEOUS SURFACE WATERS IN LEE COUNTY

Chemical analyses, in parts per million

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
LINE A CANAL NEAR FORT MYERS (Continued)																		
at Page Field (Continued)													(b)					
Aug. 23, 1944										152						747	7	
Oct. 11										650						2,740		
Nov. 17										670						2,850		
Jan. 11, 1945										860						3,450		
3/4 Mile So. of Page Field																		
Feb. 3, 1944				128	104	447	172	337	870				1,970	747		3,460	7.8	10
at U.S.G.S. control (1/4 mi. upstream from U.S. 41)																		
Feb. 3, 1944				105	54	232	200	171	458				1,120	484		1,990	8.2	32
Mar. 3									222									
Apr. 5									462									
May 4				93	38	186	a112	135	398		0.1		905	388		1,680	8.1	35
June 6									208									
July 5									215									
Aug. 23									40							259		
Oct. 12									220							1,330		
Nov. 17									178							1,020		
Jan. 11, 1945									450							2,040		

a Includes equivalent of 5 parts per million Carbonate (CO_3).
b Values reported are sum of determined constituents.

TABLE 3--Continued

MISCELLANEOUS SURFACE WATERS IN LEE COUNTY

Chemical analyses, in parts per million

Date of Collection	Mean Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$ Ca & Mg	Hardness as $CaCO_3$ NCH	Specific Conductance (micromhos at 25°C)	pH	Color
STILL LAKE NEAR FORT MYERS																		
May 11, 1943		6.7	.03	52	9.9	30	1.4	192	6.3	52	0.1	0.0	b253	170			7.1	22
MANUEL'S BRANCH AT MCGREGOR BLVD.																		
Feb. 3, 1944 (bottom)								172		10,100						29,000	7.3	29
May 5 (top)								194		14,100						39,000	7.1	30
IMPERIAL RIVER NO. OF BONITA SPRINGS																		
Dec. 16, 1939			.29	76	4.8	11		241	1.0	25			236	209		444		

b Value reported is sum of determined constituents.

TABLE 4

GROUND WATERS IN LEE COUNTY

Chemical analyses, in parts per million

Date of Collection	Depth	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$		Specific Conductance (micromhos at 25° C)	pH	Color
														Ca & Mg	NCH			
Composite of 10 wells, Fort Myers, Fla. Apr. 1, 1953	Approx 25'		3.1	147	7.1	34		367	87	55		0.7	b506	268	0	842	7.2	28

b Value reported is sum of determined constituents.